

Application No. 10/506,676  
 Reply to Office Action of September 28, 2005

### Amendments to the Claims

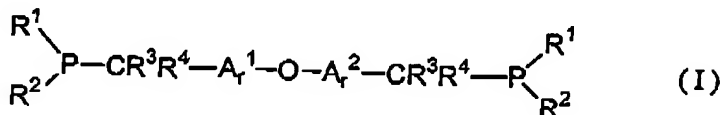
This listing of claims will replace all prior versions, and listing, of claims in the application.

### Listing of Claims

Claims 1 and 2. (Canceled)

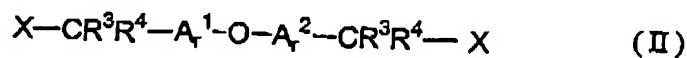
Claim 3. (Currently Amended) A The bisphosphine according to Claim 1[[,]] which is 2,2'-bis(diphenylphosphinomethyl)diphenyl ether, 2,2'-bis(diphenylphosphinomethyl)-6-methoxy-diphenyl ether, or 2,2'-bis(diphenylphosphinomethyl)-4-t-butyl-diphenyl ether.

Claim 4. (Currently Amended) A process for producing bisphosphines a bisphosphine represented by (I) of Claim 3.



~~wherein Ar<sup>1</sup> and Ar<sup>2</sup> each represents an arylene group which is optionally substituted; R<sup>1</sup> and R<sup>2</sup> each represents an alkyl group which may be substituted or an aryl group which may be substituted, or R<sup>1</sup> and R<sup>2</sup> may combinedly form a ring together with the phosphorus atom bonded thereto; R<sup>3</sup> and R<sup>4</sup> each represents hydrogen atom or an alkyl group; and the carbon atoms each having R<sup>3</sup> and R<sup>4</sup> are bonded in positions ortho to the oxygen atom bonded to Ar<sup>1</sup> and Ar<sup>2</sup>, which comprises:~~

subjecting a compound represented by formula (II)

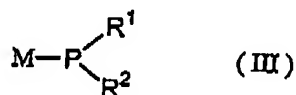


wherein Ar<sup>1</sup> and Ar<sup>2</sup>[[,]]each represents a phenylene group and each together are optionally substituted by 6-methoxy or optionally by 4-t-butyl, R<sup>3</sup> and R<sup>4</sup> are as defined above each

Application No. 10/506,676

Reply to Office Action of September 28, 2005

represents a hydrogen atom, and X represents an arylsulfonyloxy group, alkylsulfonyloxy group or a halogen atom to phosphorylation with an alkali metal phosphide represented by formula (III)



wherein  $\text{R}^1$  and  $\text{R}^2$  are ~~as defined above~~ each phenyl and M represents a lithium atom, a sodium atom or a potassium atom.

Claim 5. (Canceled)

Claim 6. (Original) The process according to Claim 4, wherein said phosphorization is carried out in the presence of an ether-based solvent.

Claim 7. (Original) The process according to Claim 6, wherein said ether-based solvent is selected from the group consisting of 1,4-dioxane, dibutyl ether, 2-ethoxyethyl ether, diethyleneglycol dimethyl ether, tetrahydrofuran and diethyl ether.

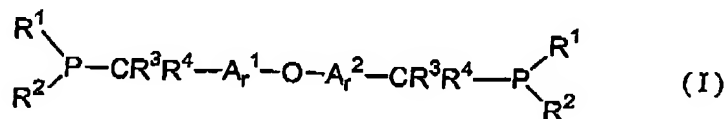
Claim 8. (Original) The process according to Claim 6, wherein said solvent comprises a mixed solvent comprising tetrahydrofuran and dibutyl ether.

Claim 9. (Previously Presented) The process according to Claim 4, wherein said alkali metal phosphide is used in an amount ranging from 2 to 4 moles per mole of said compound represented by formula (II).

Application No. 10/506,676  
 Reply to Office Action of September 28, 2005

Claim 10. (Previously Presented) The process according to Claim 9, wherein said alkali metal phosphide is used in an amount ranging from 2 to 2.2 moles per mole of said compound represented by formula (II).

Claim 11. (Currently Amended) A Group VIII metal complex, comprising:  
 a bisphosphine of Claim 3 represented by formula (I)



~~wherein Ar<sup>1</sup> and Ar<sup>2</sup> each represents an arylene group which is optionally substituted; R<sup>1</sup> and R<sup>2</sup> each represents an alkyl group which is optionally substituted or an aryl group which may be substituted, or R<sup>1</sup> and R<sup>2</sup> combinedly form a ring together with the phosphorus atom bonded thereto; R<sup>3</sup> and R<sup>4</sup> each represents hydrogen atom or an alkyl group; and the carbon atoms each having R<sup>3</sup> and R<sup>4</sup> are bonded in positions ortho to the oxygen atom bonded to Ar<sup>1</sup> and Ar<sup>2</sup>[[.]]~~ and a Group VIII metal compound.

Claim 12. (Canceled)

Claim 13. (Original) The Group VIII metal complex according to Claim 11, wherein said Group VIII metal compound is a rhodium compound, cobalt compound, ruthenium compound or iron compound having catalytic activity for hydroformylation.

Claim 14. (Original) The Group VIII metal complex according to Claim 13, wherein said Group VIII metal compound is a rhodium compound selected from the group consisting of RhO, RhO<sub>2</sub>, Rh<sub>2</sub>O, Rh<sub>2</sub>O<sub>3</sub>, rhodium nitrate, rhodium sulfate, rhodium chloride, rhodium iodide, rhodium acetate, Rh(acac)(CO)<sub>2</sub>, RhCl(CO)(PPh<sub>3</sub>)<sub>2</sub>, RhCl(CO)(AsPh<sub>3</sub>)<sub>2</sub>, RhCl(PPh<sub>3</sub>)<sub>3</sub>, RhBr(CO)(PPh<sub>3</sub>)<sub>2</sub>, Rh<sub>4</sub>(CO)<sub>12</sub> and Rh<sub>6</sub>(CO)<sub>16</sub>.

Application No. 10/506,676  
Reply to Office Action of September 28, 2005

Claim 15. (Original) The Group VIII metal complex according to Claim 14, wherein said Group VIII metal compound is  $\text{Rh}(\text{acac})(\text{CO})_2$ .

Claim 16. (Previously Presented) The Group VIII metal complex according to Claim 11, wherein the amount of said bisphosphine used is in the range of 2 to 10000 moles in terms of phosphorus atom per mole of said Group VIII metal compound in terms of Group VIII metal atom.

Claim 17. (Previously Presented) The Group VIII metal complex according to Claim 16, wherein the amount of said bisphosphine used is in the range of 2 to 1000 moles in terms of phosphorus atom per mole of said Group VIII metal compound in terms of Group VIII metal atom.

Claim 18. (Previously Presented) A process for producing aldehydes, which comprises:

hydroformylating ethylenically unsaturated compounds with carbon monoxide and hydrogen in the presence of a catalyst of a Group VIII metal complex as defined in Claim 11 to produce the corresponding aldehydes.

Claim 19. (Previously Presented) The process according to Claim 18, wherein a mixed gas comprising carbon monoxide and hydrogen having a  $\text{H}_2/\text{CO}$  molar ratio of 0.1 to 10 is fed into the reaction.

Claim 20. (Currently Amended) The process according to Claim 19, wherein a said mixed gas comprising carbon monoxide and hydrogen has a  $\text{H}_2/\text{CO}$  molar ratio of 0.5 to 2.

Application No. 10/506,676

Reply to Office Action of September 28, 2005

Claim 21. (Previously Presented) The process according to Claim 18, wherein the reaction is conducted under a pressure in the range of 0.1 to 10 MPa.

Claim 22. (Previously Presented) The process according to Claim 21, wherein the reaction pressure is in the range of 0.2 to 5 MPa.

Claim 23. (Previously Presented) The process according to Claim 18, wherein the reaction temperature is in the range of 40 to 150° C.

Claim 24. (Previously Presented) The process according to Claim 23, wherein the reaction temperature is in the range of 60 to 130° C.

Claim 25. (Previously Presented) The process according to Claim 18, wherein the amount of said Group VIII metal complex is in the range of 0.0001 to 1000 milligram-atom in terms of the Group VIII metal atom per liter of the reaction liquid.

Claim 26. (Previously Presented) The process according to Claim 25, wherein the amount of said Group VIII metal complex is in the range of 0.005 to 10 milligram-atom in terms of the Group VIII metal atom per liter of the reaction liquid.